Chapter 3:

Contractor Guidance

3.1 -- Developing the Contract WBS

The Contract WBS provides the framework for the management control system. An auditable and traceable summary of internal data is provided by its performance measurement procedures.

3.1.1 -- Relationship of Program WBS to Contract WBS

Contracts for work breakdown structure elements that are in the Program WBS will become Level 1 Contract WBS elements with all applicable Level 2 Common WBS elements included. The result is the contract work breakdown structure. Figure 3-1 depicts the development and relationship of the Program WBS with the Contract WBS.

3.1.2 -- Subcontractors

Contractors may require subcontractors to use the work breakdown structure to fulfill contractual requirements and control the subcontract. These subcontractors (whose work accounts for a major segment of the subcontracted portion of the prime contract) are delineated in contracts at the time of award. The prime or associate contractor is responsible for incorporating the work breakdown structure requirements into the contract with the affected subcontractors. Figure 3-2 provides an example of a prime work breakdown structure and its relationship to a subcontract work breakdown structure.

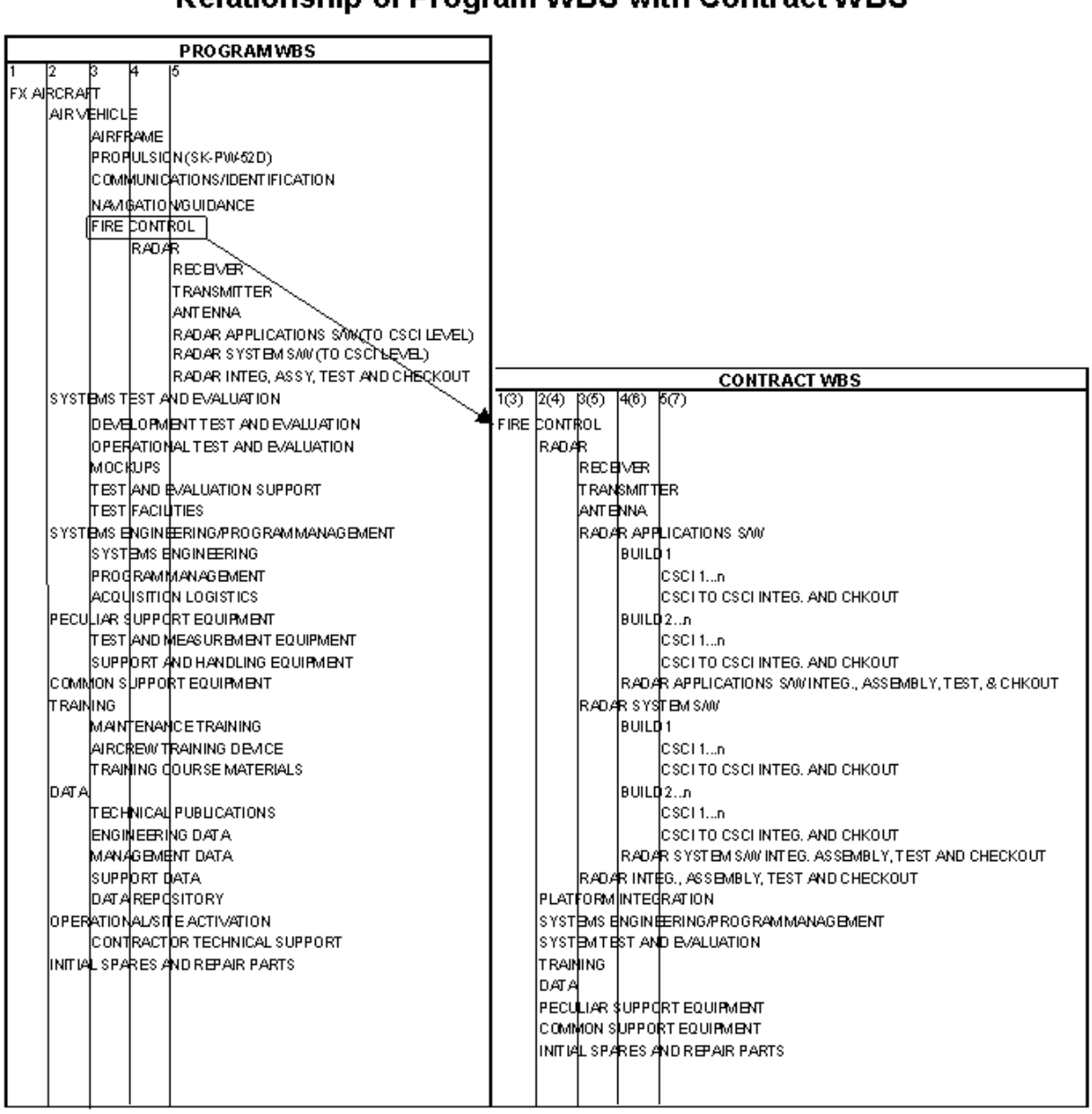

Figure 3-1: -- Relationship of Program WBS with Contract WBS

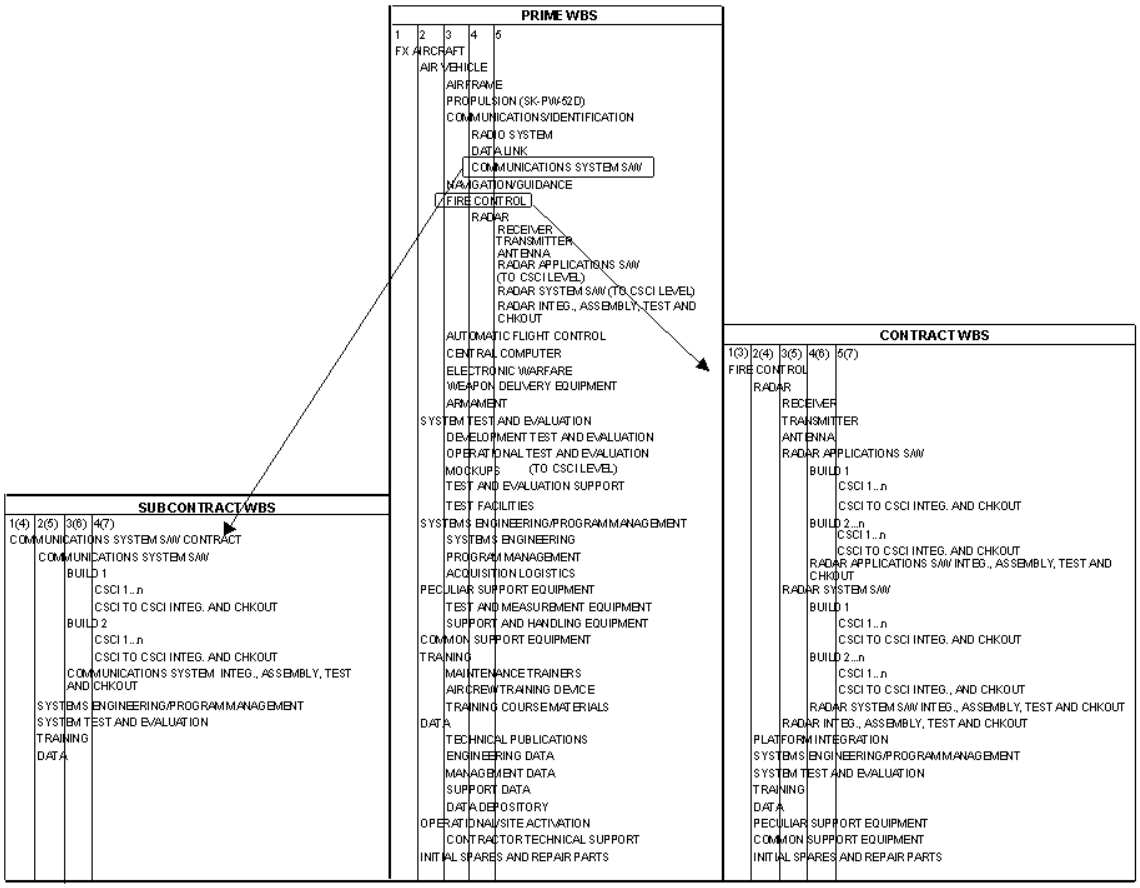

Figure 3-2: -- Relationship of Contract WBS to Subcontract WBS

3.1.3 -- Organizational Structure

A WBS should not influence or in any way affect the contractor's program organization. That is, a contractor can be organized in any way (e.g., by function, process, or integrated product team) and effectively use a valid, product-oriented WBS. As Figure 3-3 illustrates, at some level in an organization there is the point at which a control account (also referred to as a cost account) is managed. Likewise, in any WBS the same point exists. Therefore every part of a WBS is visible or accessible regardless of the contractor's organization. For example, the management information needed by the government to manage the development of a radar receiver is available from the control accounts that are part of that effort's WBS. So too, the information the contractor needs to manage the development is available from the same control accounts, which in this example are a part of the contractor's Electrical Design Department. Figure 3-4 illustrates the same example but using an Integrated Product Team (IPT) structured organization and its interface with the Contract WBS.

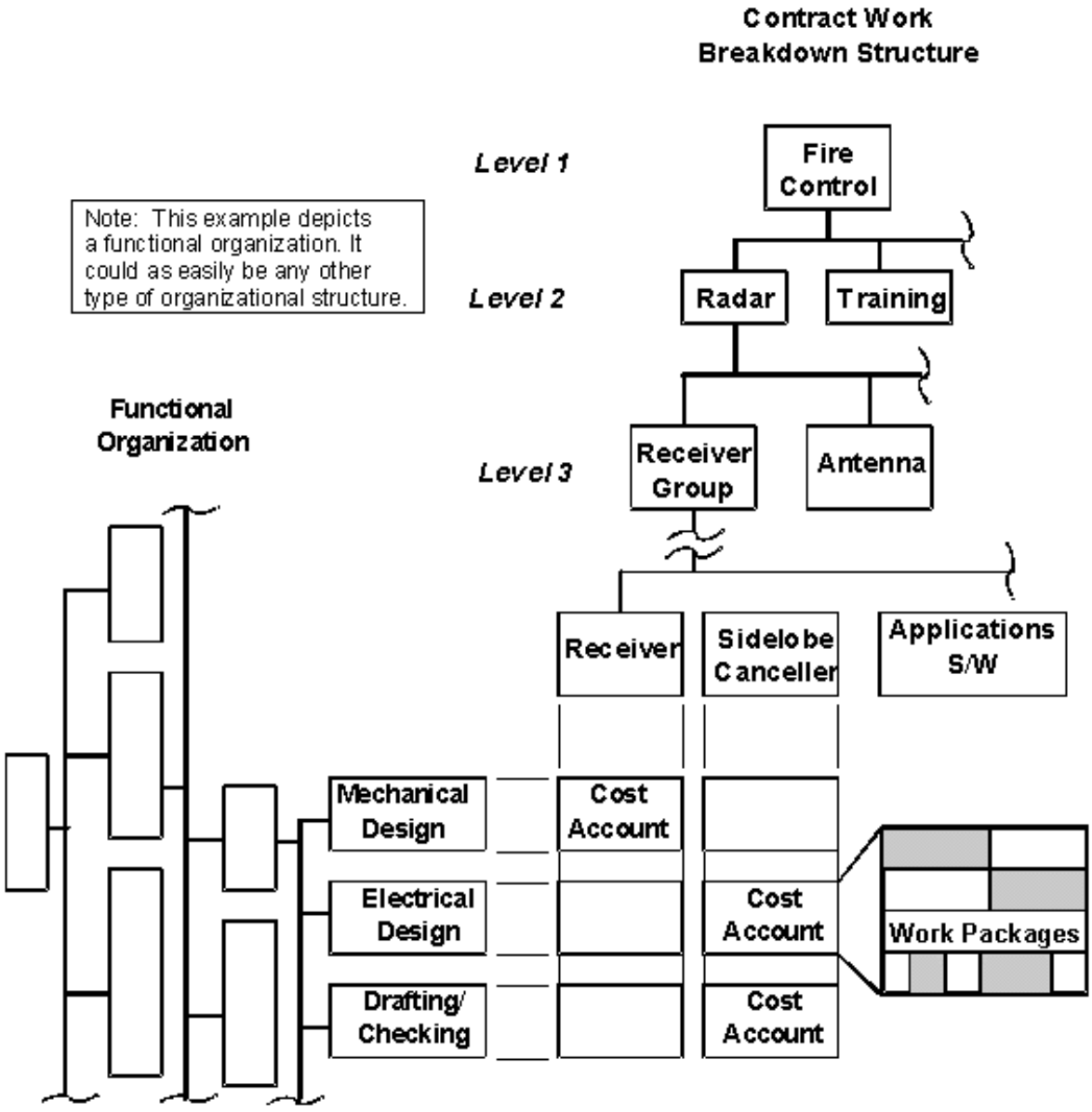

Figure 3-3: -- Translation from Function to Product

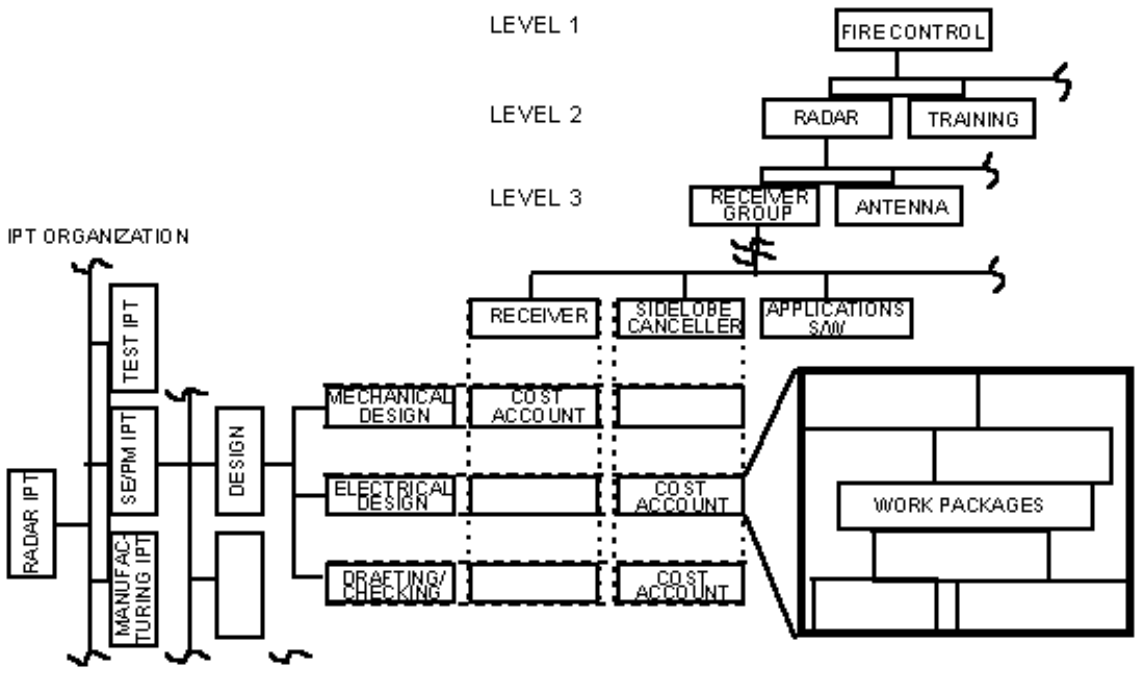

Figure 3-4: -- IPT Intersection with Contract WBS

3.1.4 -- Control Account Level

To provide the responsible contract manager with technical, schedule, and other needed resource information, the management control system must be keyed to the same work breakdown structure element and organization unit. The WBS level at which the management control system is established is primarily a function of the magnitude of the program and the type of product. The responsible organizational level is a function of the company's management span of control and its upper management's desire to delegate the responsibility for WBS elements to lower management levels. In identifying control accounts, the contractor is expected to establish organizational responsibilities at meaningful and appropriate levels. Otherwise the contractor's existing management control systems and responsibility assignments may be affected adversely.

Virtually all aspects of the contractor's management control system -- technical definition, budgets, estimates, schedules, work assignments, accounting, progress assessment, problem identification, and corrective actions -- come together at the control account level. Performance visibility is directly relatable to this level and content.

As the end product is subdivided into smaller subproducts at lower work breakdown structure levels, the work effort required by each element can be identified to functional organization units. At some point within the work breakdown structure, the contractor will assign management responsibility for technical, schedule, and other performance. The management control system will keep the lower levels of the work breakdown structure visible as it interfaces with the organization. At the juncture of the work breakdown structure element and organization unit, control accounts are established and performance is planned, measured, recorded, and controlled. To this end, the technical requirements for the work and work product must be

specified; the work scheduled, budgeted, and performed; and attainment of specified technical requirements verified.

Because the work breakdown structure is a product-oriented hierarchy, its progressive subdivision will result in common management or functional tasks occurring in many work breakdown structure elements. For example, software may be widespread throughout the work breakdown structure and represent high risk in the contract. In such cases, when the program manager may require specific visibility into software performance, care must be taken to not unnecessarily complicate the Contract WBS and the contractor's management system. Appropriate reporting requirements should be specified in the statement of work. As Figure 3-5 shows, the contractor's management system and the work breakdown structure can provide needed detail and visibility without extending the work breakdown structure to excessively low levels or developing a separate work breakdown structure for software. The required information can be aggregated for reporting as needed.

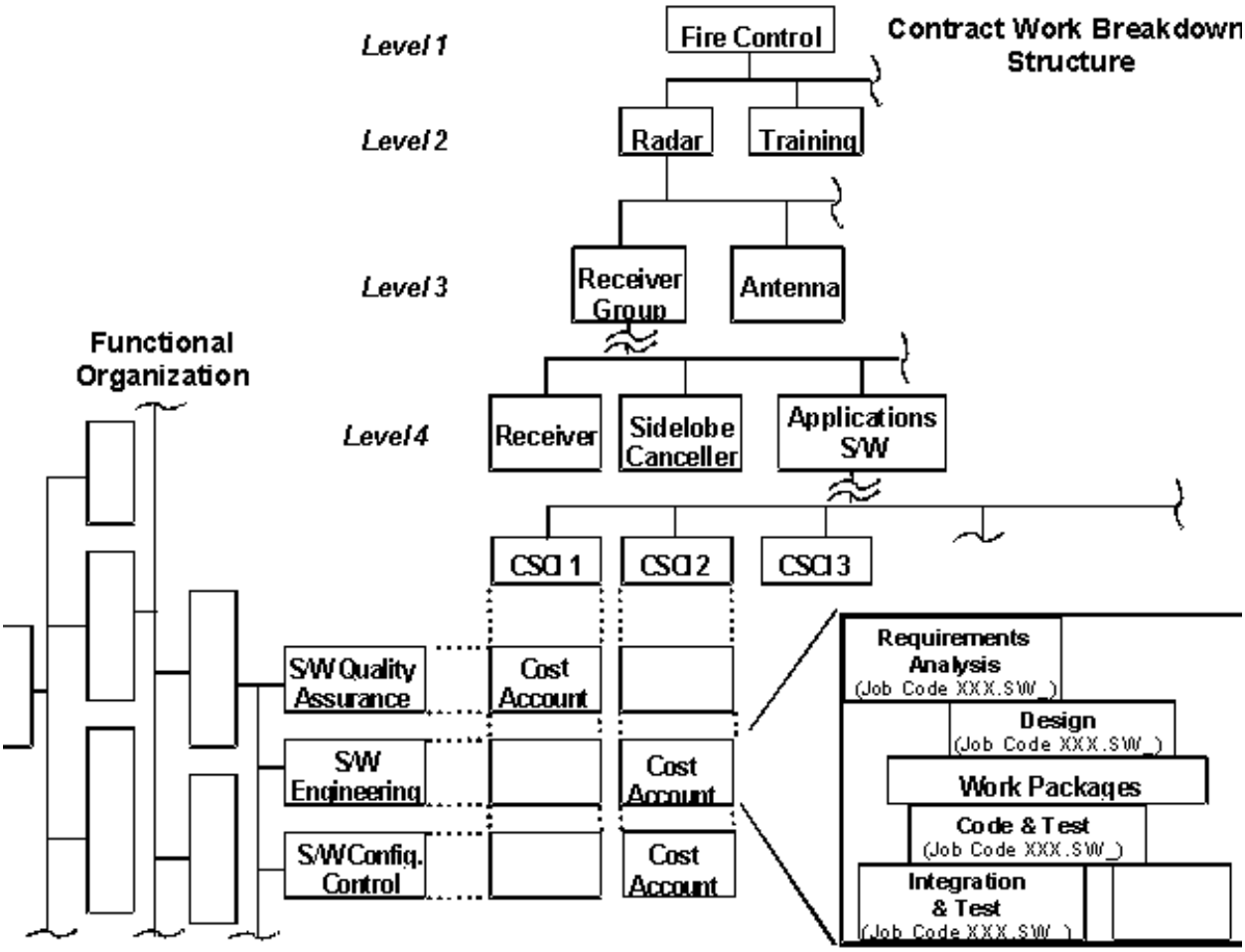

Figure 3-5: Linkage Between Contractor WBS and Contractor Management Systems

Figure 3-5: -- Linkage Between Contractor WBS and Contractor Management Systems

3.2 -- Contractual Issues

The contractor's expanded work breakdown structure must address all Program WBS elements. Contractors should include lower breakdown levels where they identify risk associated with technical issues or resources, and identify control plans whether or not the items are reported back to the government. For example, software development tends to be high technical risk and high cost. Since all software that is an integral part of any specific equipment system and subsystem specification or specifically designed and developed for system test and evaluation should be identified with that system, subsystem, or effort, it may be appropriate to collect lower level information when it exists. In such cases, the following structure and definitions could be used:

Level 4	**Level 5**
Build 1..n (Specify names)	CSCI 1..n (Specify names) CSCI to CSCI Integration and Checkout
Integration, Assembly, Test and Checkout	

3.2.1 -- Software and Software Intensive Systems

The importance of software in today's government acquisition environment is growing. As a result software is identified in two ways for development of a work breakdown structure: the first type of software is that which operates or runs on a specific piece of equipment, and the second type of software is that which may be contracted for separately from the operating equipment or is a stand alone (software intensive system). Software that is being developed to reside on specific equipment must be identified as a subset of that equipment. Multi-function software will be identified as a subset of the equipment work breakdown structure element which either includes the software in the element specification or exercises the most critical performance constraint. Refer to Figure 3-1 for an example of how software should be addressed as part of a specific equipment. In cases where the application of this rule results in a conflict in the selection of the proper element, the specification relationship will take precedence. For example, an aircraft's electronic equipment typically has software included in each of the subsystem elements. Software that resides and interfaces with more than one equipment, i.e., applications software, and overall system software which facilitates the operation and maintenance of the computer systems and associated programs (e.g., operating systems, compilers, and utilities) will be called out at the appropriate work breakdown level within the program.

It is incorrect to summarize all software on a program or contract in a work breakdown structure. By separating these elements from the hardware they support, performance measurement and management control over each equipment is difficult to maintain. The true cost of each equipment is not readily available for decision concerning that equipment. Rather than separately summarizing software, it is important to identify software with the hardware it

supports. (When needed, a contractor's management systems can use an identifier for each software element to produce summaries for software management purposes.)

A separately contracted or stand alone software will include the software, data, services, and facilities required to develop and produce a software product for a command and control system, radar system, information system, etc. Where software is considered stand alone (i.e., does not reside or support a specific equipment, or is considered a pure software upgrade, etc.), the government should use the same product-oriented work breakdown structure format. Figure 3-6 provides an example of a work breakdown structure for a stand alone software system.

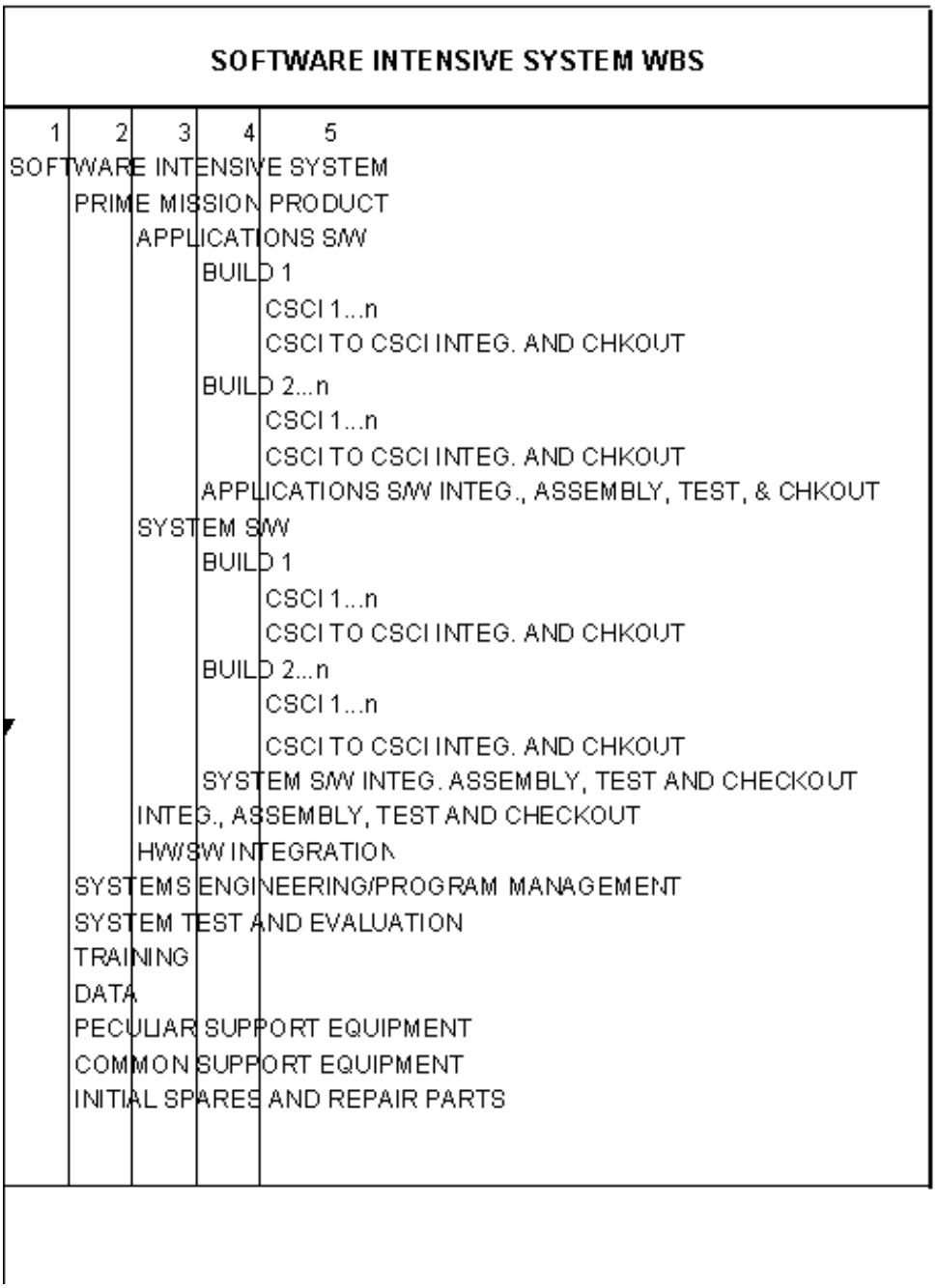

Figure 3-6: -- Example of Software Intensive System WBS

3.2.2 -- Integrated Management Plan and Integrated Management Schedule (IMP/IMS)

The Integrated Management (or Master) Plan (IMP) is the keystone of the technical control concept. It is an integral part of the Systems Engineering process and identifies key events, milestones, reviews, all integrated technical tasks, and risk reduction activities. In addition the

IMP is the specific tool used to track and measure successful task completion -- a progress measurement tool. The contractor identifies key events and tasks along with entry and exit criteria. The contractor proposed events are negotiated and placed on contract. These events can be used as the basis for quantitative requirements for award fees.

The contractor will also prepare an Integrated Management (or Master) Schedule (IMS) to support these events and tasks. The IMS depicts the work to be done in terms of supporting activities, schedules, and completion dates as it is tied to the IMP (i.e., Initiate PDR or Complete PDR, etc.) The linkage between the specification requirements, work breakdown structure, contractor's statement of work, technical performance measurements, events, and the IMS provide traceability and serve as a significant risk management tool. Figure 3-7 illustrates these interrelationships.

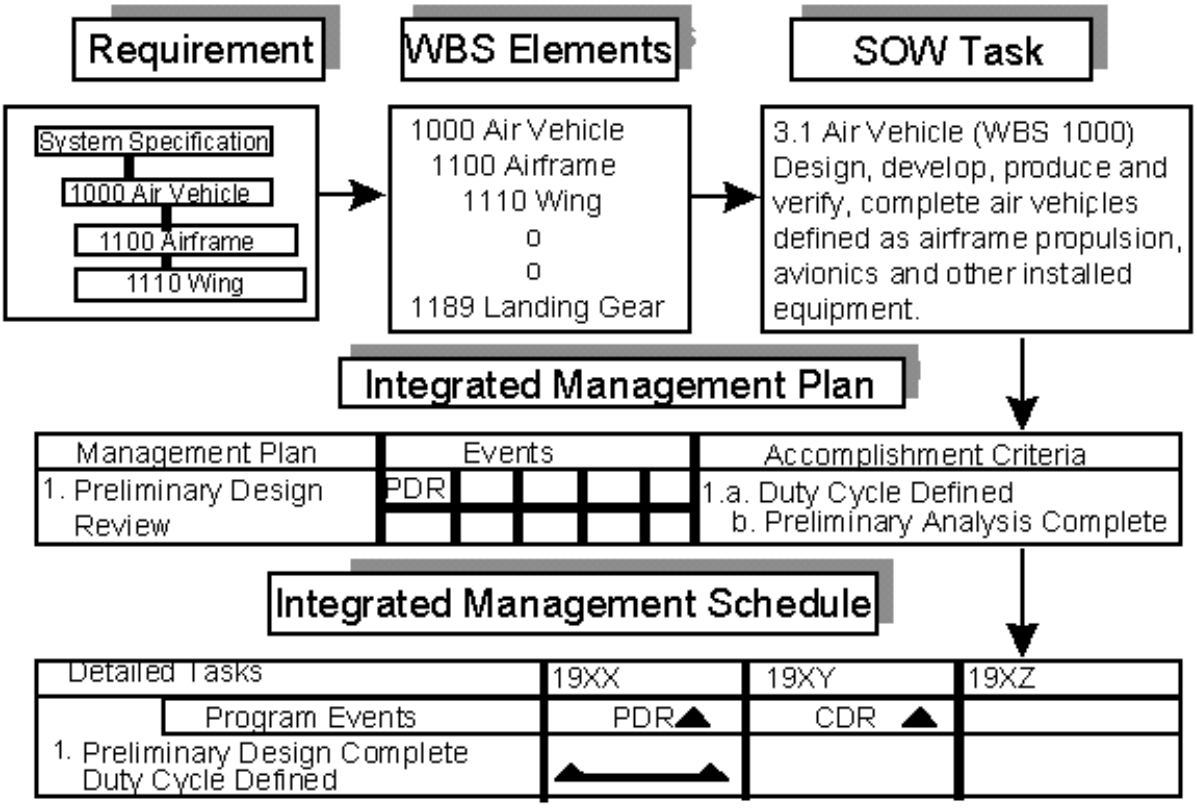

Figure 3-7: -- Integrated Management Plan and Integrated Management Schedule